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(54) Use of aqueous lubricant solutions based on fatty alkyl amines.

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WO-A-89/10348
DE-A- 3 631 953
FR-A- 2 602 955
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Description

The present invention relates generally to aqueous amine-containing lubricant solutions. More particularly, the present invention relates to such lubricant solutions and their use as a conveyor belt lubricants for the lubrication of conveyor belts for bottles.

Lubricants are employed in applications in which good gliding contact between solid surfaces, for instance glass and metal or metal and metal, must be ensured. Amine-containing synthetic lubricants are, in general, known for a variety of such applications. See, for example, US-A-3372112, US-A-3814212, US-A-4549974, GB-A-1294038, EP-A-0032415, WO-A-87/07638 and JP-A-82/205494.

Additionally known are amine-containing cleaning solutions for, e.g., milk equipment and silver. See FR-A-2602955 and US-A-3468804.

Lubricants are also frequently used in bottle filling and conveying plants, where they are applied to the conveyor belts to ensure the trouble-free conveyance of bottles on the conveyor belt. When used as such, the lubricants are also referred to as belt lubricants.

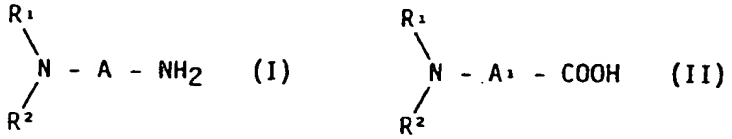
In many typical systems, a soap such as a potash-based soft soap is used as the belt lubricant. A problem of such soaps is that they have a tendency to form poorly-soluble precipitates with cations present in hard water, such as calcium, requiring the addition of sequestering agents or the use of soft water.

As a substitute for the soaps, a variety of synthetic belt lubricants including certain amine compounds have been described in the literature. See, for example, DE-A-3631953 (US-A-4839067), JP-A-74/010794, JP-A-89/096294, US-A-4521321, US-A-4604720, ZA-A-77/7258, ZA-A-83/7963 and AU-A-10004/83. These synthetic belt lubricants are generally an improvement over the aforementioned potash-based soaps; however, in some cases they tend to form poorly-soluble precipitates with polyvalent anions present in hard water, such as carbonates and sulphates, which manifests itself in the clouding of the lubricant solution. For that reason the behavior of lubricants in anion-containing water is sometimes called clouding behavior.

Since the precipitates formed can cause breakdowns as a result of deposits in blind zones or clogging of nozzles, they must be removed regularly, mostly once a day, by cleaning the plant. Heavy clouding behavior of a lubricant solution is especially critical in places where the water contains a high proportion of polyvalent anions. In fact, the problem in some places may be so great that soft water is used instead of tap water, or substantially more frequent cleaning is required.

Surprisingly, it has now been found that an aqueous lubricant solution, based in part on a particular group of fatty alkyl amines as further defined below, exhibits substantially improved clouding behavior, particularly in water with a high proportion of polyvalent anions, as well as very favorable gliding action.

Accordingly, the present invention relates to the use of an aqueous lubricant solution comprising from 0.001 to 1% by weight, based on the weight of the aqueous lubricant solution, of at least one compound of the formulas (I) or (II):



(I) (II)

wherein

- R^1 is a saturated or unsaturated, branched or linear alkyl group having 8-22 carbon atoms,
- R^2 is hydrogen, an alkyl group or hydroxyalkyl group having 1-4 carbon atoms, or $-A-NH_2$,
- A is a linear or branched alkylene group having 1-8 carbon atoms, and
- A^1 is a linear or branched alkylene group having 2-4 carbon atoms; and having a pH of from 5 to 8, for lubricating conveyor belts.

As further described below, the aqueous lubricant solution may also contain other additives as needed, for example, one or more of other fatty alkyl amines, acids to adjust the solution pH, dispersing agents and dissolving agents.

The aqueous lubricant solutions in accordance with the present invention find particular use in bottle conveying processes, in which a conveyor belt is lubricated with at least one lubricating agent comprising these aqueous lubricant solutions.

When used as belt lubricants, the aqueous lubricant solutions according to the present invention display very favorable lubricating properties and, because of the presence of the fatty alkyl amines of the formulas (I) and (II), also display improved clouding behavior as compared with other prior art lubricating solutions, such as those of DE – A – 3631953 which are based on neutralized primary fatty alkyl monoamines.

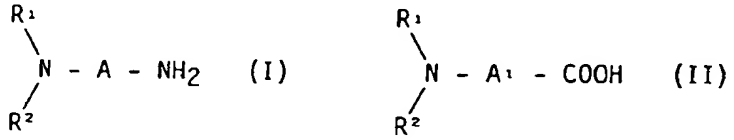
Additionally, in the stated pH range the presence of a sequestering agent is not required because of this improved clouding behavior, and cleaning may take place at less frequent intervals on account of reduced forming of precipitate.

Still further, the aqueous lubricant solutions according to the present invention possess low foaming tendencies and good antimicrobial properties.

The aqueous lubricant solutions according to the invention are preferably prepared as a concentrate and diluted to its end concentration prior to use. As a result of their improved clouding behavior, dilution of these aqueous lubricant solutions is possible with water having a high proportion of polyvalent anions.

These and other features and advantages of the present invention will be more readily understood by those skilled in the art from a reading of the following detailed description.

As mentioned above, the aqueous lubricant solutions used according to the present invention contain from 0.001 to 1% by weight, based on the weight of the aqueous lubricant solution, of a fatty alkyl amine of the formulas (I) or (II):



(I) (II)

wherein

R^1 is a saturated or unsaturated, branched or linear alkyl group having 8 – 22 carbon atoms,

R^2 is hydrogen, an alkyl group or hydroxyalkyl group having 1 – 4 atoms, or $-A-NH_2$,

A is a linear or branched alkylene group having 1 – 8 carbon atoms, and

A^1 is a linear or branched alkylene group having 2 – 4 carbon atoms.

Preferred are compounds in which R^1 is a saturated or unsaturated, branched or linear alkyl group having 12 – 18 carbon atoms; R^2 is hydrogen or $-A-NH_2$; and A and A^1 are saturated alkylene groups having 2 – 4 carbon atoms. Especially preferred are those compounds in which R^1 has the above-mentioned meaning, R^2 is hydrogen, and A and A^1 are propylene groups.

As examples of such fatty alkyl amines may be mentioned N – coco – 1,3 – diaminopropane, N – tallow – 1,3 – diaminopropane, N – oleyl – 1,3 – diaminopropane, N – lauryl – 1,3 – diaminopropane and N – coco – beta – amino butyric acid.

Particularly preferred for use in the aqueous lubricant solutions according to the present invention are the aforedescribed fatty alkyl amines of the formula (I) due in part to their antimicrobial properties.

In preferred embodiments, the aqueous lubricant solutions comprise from 0,005% to 0,1% by weight, based on the weight of the aqueous lubricant solution, of fatty alkyl amines of the formulas (I) and (II).

In addition to the above – mentioned fatty alkyl amines, the aqueous lubricant solutions according to the present invention may also contain a fatty alkyl monoamine of the formula (III):

(III)

wherein

R^3 is a saturated or unsaturated, branched or linear alkyl group having 8 – 22 carbon atoms,

R^4 is hydrogen, an alkyl group or hydroxyalkyl group having 1 – 4 carbon atoms, and

R^5 is equal to R^3 or R^4.

As examples of such fatty alkyl monoamines may be mentioned hexadecyl dimethyl amine, octadecyl dimethyl amine, coco dimethyl amine, tallow dimethyl amine, oleyl dimethyl amine, dicoco methyl amine, ditallow methyl amine, oleyl amine, coco amine and lauryl amine.

In preferred embodiments, the aqueous lubricant solution comprises from 0 to 1% by weight, preferably from 0 to 0,5% by weight, and especially from 0 to 0,1% by weight, based upon the weight of the aqueous

lubricant solution, of fatty alkyl monoamines of the formula (III).

The aqueous lubricant solutions may contain mixtures of the above-described fatty alkyl amines having alkyl groups of different chain lengths, as well as mixtures comprising a proportion of unsaturated fatty alkyl amines of at least 50%, based on the total amount of fatty alkyl amines.

To improve the solubility of the fatty alkyl amines, acids which form pH-neutral salts with the amines may be added to the lubricant composition, organic acids being given preference over inorganic acids because of their more favorable solubility.

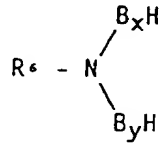
Although in principle use may be made of all organic acids, preference is given to acetic acid, formic acid and gluconic acid. The acids are used in amounts sufficient to set the pH of the solution at from 5 to 8, preferably from 6 to 8, generally requiring amounts ranging from 0,001% to 1% by weight, preferably from 0,005% to 0,1% by weight, based upon the weight of the aqueous lubricant solution.

As further constituents of the lubricant solution may be mentioned, for example, dissolving agents and dispersing agents.

Dissolving agents are generally used in amounts ranging from 0 to 20% by weight, preferably from 0 to 10% by weight, based upon the weight of the aqueous lubricant solution. As particular examples of suitable dissolving agents may be mentioned isopropanol, ethanol and glycols such as ethylene glycol, propylene glycol and hexylene glycol.

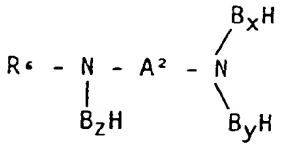
Dispersing agents may be added to the lubricant solution generally in amounts ranging from 0 to 1% by weight, preferably from 0 to 0,5% by weight, and especially from 0 to 0,1% by weight, based upon the weight of the aqueous lubricant solution.

As examples of suitable dispersing agents may be mentioned triethanolamine, and alkoxylated fatty alkyl monoamines and diamines of the formulas (IV) and (V):



(IV)

and



(V)

wherein

R^6 is a linear or branched, saturated or unsaturated alkyl group having 8-22 carbon atoms,

A^2 is a linear or branched alkylene group having 1-8 carbon atoms,

B represents ethoxy or propoxy groups, which may be the same or different in each of the above uses, and

the sum of x and y and, optionally, z is a number in the range of 2 to 200.

As examples of such compounds may be mentioned coco bis(2-hydroxyethyl)amine, polyoxyethylene(5)coco amine, polyoxyethylene(15)coco amine, tallow bis(2-hydroxyethyl)amine, polyoxyethylene(5)tallow amine, tallow/oleyl bis(2-hydroxyethyl)amine, oleyl bis(2-hydroxyethyl)amine, polyoxyethylene(5)oleyl amine, polyoxyethylene(15)oleyl amine, tallow bis(2-hydroxyethyl)amine (hydrogenated), polyoxyethylene(5)tallow amine (hydrogenated), polyoxyethylene(15)tallow amine (hydrogenated), polyoxyethylene(50)tallow amine (hydrogenated), N,N',N'-tris(2-hydroxyethyl)N-tallow-1,3-diaminopropane, N,N',N'-polyoxyethylene(10)-N-tallow-1,3-diaminopropane, N,N',N'-polyoxyethylene(15)-N-tallow-1,3-diaminopropane, and polyoxyethylene(15)tallow amine.

The aqueous lubricant solutions according to the present invention are preferably prepared as concentrates comprising from 1% to 30% by weight, based upon the weight of the concentrate, of the amines of the formulas (I) and (II). Additionally, such concentrates may comprise from 0 to 25% by weight of the amines of the formula (III), from 1 to 30% by weight of acid to result in pH upon dilution of from 5 to 8, from 0 to 15% by weight of the dispersing agent and from 0 to 50% by weight of the dissolving agent. The remainder of the concentrate generally comprises an aqueous base (water).

To prepare the lubricant solutions according to the invention the concentrates are diluted in an aqueous base to their end concentration prior to use. Dilution is usually carried out with tap water, but may also be carried out with soft water as well as with any water-miscible liquid, such as ethanol, isopropanol , and glycols, or with mixtures of such liquids with water.

The aqueous lubricant solutions in accordance with the present invention, as mentioned above, find particular use in bottle coveying processes, in which a conveyor belt is lubricated with a lubricating amount of at least one lubricating agent comprising these aqueous lubricant solutions. Such bottle conveying processes and apparatus utilized therein are well-known in the art, as exemplified by the disclosure of DE-A-3631953 (US-A-4839067), and need not be discussed further herein.

Advantages of the aqueous lubricant solutions acccording to the invention are demonstrated in the following Examples, which are offered by way of illustration and not limitation thereof.

EXAMPLES

Example 1

Concentrates of the following compositions were prepared (all amounts are in per cent by weight):

TABLE I

Concentrate Compositions							
Constituents	A	B	C	D	E	F	G
Water	71,0	70,5	67,5	66,5	70,5	66,2	71,0
Acetic acid (60%)	5	5	8	5	5	9,3	5
Coco amine	5,5	–	–	–	6	–	5,5
Oleyl amine	–	–	–	–	–	–	6,5
N-coco-1,3-diaminopropane	–	6	6	12	–	–	–
N-oleyl-1,3-diaminopropane	6,5	6	6	6	6	–	–
N-coco-beta-amino butyric acid	–	–	–	–	–	12	–
Polyoxyethylene(15)-oleyl amine	2	2	2	–	2	2	2
Triethanolamine	1,5	1,5	1,5	1,5	1,5	1,5	1,5
Isopropanol	8,5	9	9	9	9	9	8,5

As comparative product based upon a primary fatty alkyl monoamine was used a composition according to Example 1 of DE-A-3631953 (Composition G).

Example 2

In a flask 0,6 g of the compositions of Example 1 and 200 ml water were mixed with stirring to prepare solutions with which the clouding behavior and gliding action were tested as follows:

(a) For testing the clouding behavior, tap water having a degree of hardness of 4-8° dH, and also soft water to which were added 500 ppm of chloride ions and 500 ppm of sulphate ions and which had a degree of hardness of 20° dH, were used as diluting water for the preparation of solutions for use from the concentrates.

The clouding that occurred was assessed visually at various time intervals and comparatively qualified by the assignment of a number in the range of 1 to 5, with the solution with the slightest clouding being rated 1 and that with the greatest clouding being rated 5.

The clouding after 6 hours of the soft water/chloride-sulphate ion solution (20° dH) was also assessed by means of a haze meter (Type UKM 1d of the firm Radiometer, Copenhagen), with the results expressed in EBC (European Brewery Convention) units.

(b) For testing of the gliding action, 0,3 ml of the lubricant solutions prepared with tap water (4-8° dH) were applied to a glass disc over which a metal disc attached to an electric motor was rotated, the gliding action being determined by means of the constancy of the rotary motion and the change in the power consumption of the electric motor driving the metal disc. The metal disc had a surface area of 7 cm^2 and was pressed onto the glass plate with a pressure of about 500 g/cm^2.

The experimentally obtained data for the various compositions was evaluated, with the experimental value of the comparative solution G arbitrarily being rated 100 and the remaining lubricant solution values being expressed in relation thereto. The results of the xperiments 2 (a) and (b) are summarized below in Table II.

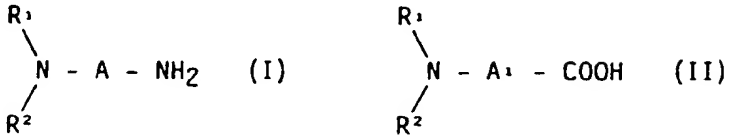
Table 2: Clouding behavior and gliding action

Composition	pH	Clouding behavior immediately upon addition		Clouding behavior after 6 hours		Clouding Behavior after 6 hours (Measured)	Clouding behavior after 24 hours		gliding action
		synthetic water	tap water	synthetic water	tap water	synthetic water / water	synthetic water	tap water	
A	7,25	2	2	2	2	8	2	2	100
B	7,65	3	3	3	3	24	2	2	100
C	6,8	1	1	1	1	< 0,5	1	1	100
D	7,9	2	2	2	2	8	3	3	100
E	7,65	4	4	4	4	68	4	4	110
F	5,1	1	1	1	1	< 0,5	1	1	100
G	7,2	5	5	5	5	128	5[1]	5[1]	100

1) conglomerate forming

Claims

1. Use of an aqueous lubricant solution comprising : (a) from 0.001 to 1% by weight of the aqueous lubricant solution, of at least one compound of th formulas (I) or (II):



wherein

R^1 is a saturated or unsaturated, branched or linear alkyl group having 8 – 22 carbon atoms,
R^2 is hydrogen, an alkyl group or hydroxyalkyl group having 1 – 4 carbon atoms, or $-A-NH_2$,
A is a linear or branched alkylene group having 1 – 8 carbon atoms, and
A^1 is a linear or branched alkylene group having 2 – 4 carbon atoms; and having a pH of from 5 to 8, for lubricating conveyor belts.

2. Use of the aqueous lubricant solution according to claim 1, wherein R^1 is a saturated or unsaturated, branched or linear alkyl group having 12 – 18 carbon atoms; R^2 is hydrogen or $-A-NH_2$; and A and A^1 are a saturated alkylene group having 2 – 4 carbon atoms.

3. Use of the aqueous lubricant solution according to claim 2, wherein R^2 is hydrogen, and A and A^1 are a propylene group.

4. Use of the aqueous lubricant solution according to claim 1, wherein the solution has a pH of from 6 to 8.

5. Use of the aqueous lubricant solution according to claim 1, wherein the solution comprises at least one fatty alkyl amine of the formula (I).

6. Use of the aqueous lubricant solution according to claim 1, wherein the solution further comprises one or more of:
b) a fatty alkyl monoamine of the formula (III):

wherein

R^3 is a saturated or unsaturated, branched or linear alkyl group having 8 – 22 carbon atoms,
R^4 is hydrogen, an alkyl group or hydroxyalkyl group having 1 – 4 carbon atoms, and
R^5 is equal to R^3 or R^4;
(c) an acid to set the pH of the lubricant solution at from about 5 to about 8;
(d) a dispersing agent; and
(e) a dissolving agent.

7. Use of the aqueous lubricant solution according to claim 6, wherein the solution comprises:
(b) from 0 to 1% by weight of the fatty alkyl monoamine of the formula (III);
(c) from 0,001% to 1% by weight of the acid;
(d) from 0 to 1% by weight of the dispersing agent; and
(e) from 0 to 20% by weight of the dissolving agent; wherein % by weight is based upon the weight of the aqueous lubricant solution.

8. Use of the aqueous lubricant solution according to claim 7, wherein the solution comprises:
(a) from 0,005% to 0,1% by weight of the fatty alkyl amines of the formulas (I) and (II),

(b) from 0 to 0,5% by weight of the fatty alkyl monoamine of the formula (III);
(c) from 0,005% to 0,1% by weight of the acid;
(d) from 0 to 0,5% by weight of th dispersing agent; and
(e) from 0 to 10% by weight of the dissolving agent.

9. Use of a concentrate for preparing an aqueous conveyor belt lubricant solution according to any of of claims 1 – 8, wherein the concentrate comprises (a) from 1% to 30% by weight, based upon the weight of the concentrate, of the fatty alkyl amines of the formulas (I) and (II).

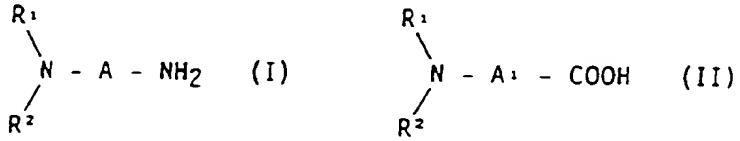
10. Use of the concentrate according to claim 9, wherein the concentrate additionally comprises:
(b) from 0 to 25% by weight of the amines of the formula (III),
(c) from 1 to 30% by weight of an acid to result in pH upon dilution of from 5 to 8,
(d) from 0 to 15% by weight of a dispersing agent, and
(e) from 0 to 50% by weight of a dissolving agent.

11. Use of the concentrate according to claim 10, wherein the remainder of the concentrate comprises an aqueous base.

12. A process for conveying bottles comprising the step of lubricating a bottle conveyor with a lubricating amount of the aqueous lubricant solution of any one of claims 1 – 8.

Patentansprüche

1. Verwendung einer wäßrigen Schmiermittellösung, die (a) 0.001 bis 1 Gew.%, auf Basis des Gewichts der wäßrigen Schmiermittellösung, mindestens einer Verbindung der Formeln (I) oder (II):



worin
R^1 eine gesättigte oder ungesättigte, verzweigte oder lineare Alkylgruppe mit 8 – 22 Kohlenstoffatomen,
R^2 Wasserstoff, eine Alkylgruppe oder Hydroxyalkylgruppe mit 1 – 4 Kohlenstoffatomen oder $-A-NH_2$,
A eine lineare oder verzweigte Alkylengruppe mit 1 – 8 Kohlenstoffatomen und
A^1 eine lineare oder verzweigte Alkylengruppe mit 2 – 4 Kohlenstoffatomen bedeuten,
enthält und einen pH – Wert von 5 bis 8 besitzt, für die Schmierung von Förderbändern.

2. Verwendung der wäßrigen Schmiermittellösung gemäß Anspruch 1, worin R^1 eine gesättigte oder ungesättigte, verzweigte oder lineare Alkylgruppe mit 12 – 18 Kohlenstoffatomen, R^2 Wasserstoff oder $-A-NH_2$, und A und A^1 eine gesättigte Alkylengruppe mit 2 – 4 Kohlenstoffatomen bedeuten.

3. Verwendung der wäßrigen Schmiermittellösung gemäß Anspruch 2, worin R^2 Wasserstoff ist und A und A^1 eine Propylengruppe bedeuten.

4. Verwendung der wäßrigen Schmiermittellösung gemäß Anspruch 1, worin die Lösung einen pH – Wert von 6 als 8 besitzt.

5. Verwendung der wäßrigen Schmiermittellosung gemäß Anspruch 1, worin die Lösung mindestens ein Fettalkyl – amin der Formel (I) enthält.

6. Verwendung der wäßrigen Schmiermittellösung gemäß Anspruch 1, worin die Lösung außerdem eines oder mehrere enthält von:

(b) ein Fettalkyl - monoamin der Formel (III)

(III)

worin

R^3 eine gesättigte oder ungesättigte, verzweigte oder lineare Alkylgruppe mit 8 - 22 Kohlenstoffatomen und

R^4 Wasserstoff, eine Alkylgruppe oder Hydroxyalkylgruppe mit 1 - 4 Kohlenstoffatomen bedeuten und

R^5 gleich R^3 oder R^4 ist;

(c) eine Säure, um den pH - Wert der Schmiermittellösung auf etwa 5 bis etwa 8 einzustellen;

(d) ein Dispergiermittel; und

(e) ein Auflösungsmittel.

7. Verwendung der wäßrigen Schmiermittellösung gemäß Anspruch 6, worin die Lösung enthält:
(b) 0 bis 1 Gew.% des Fettalkyl - monoamins der Formel (III);
(c) 0.001 bis 1 Gew.% der Säure;
(d) 0 bis 1 Gew.% des Dispersionsmittels; und
(e) 0 bis 20 Gew.% des Auflösungsmittels;
wobei die Gewichtsprozente sich auf das Gewicht der wäßrigen Schmiermittellösung beziehen.

8. Verwendung der wäßrigen Schmiermittellösung gemäß Anspruch 7, worin die Lösung enthält:
(a) 0.005 bis 0.1 Gew.% der Fettalkylamine der Formel (I) und (II);
(b) 0 bis 0.5 Gew.% des Fettalkyl - monoamins der Formel (III);
(c) 0.005 bis 0.1 Gew.% der Säure;
(d) 0 bis 0.5 Gew.% des Dispersionsmittels; und
(e) 0 bis 10 Gew.% des Auflösungsmittels.

9. Verwendung eines Konzentrats zur Herstellung einer wäßrigen Förderband - Schmiermittellösung gemäß einem der Ansprüche 1 - 8, worin das Konzentrat (a) 1 bis 30 Gew.%, auf Basis des Konzentrats, der Fettalkylamine der Formeln (I) und (II) enthält.

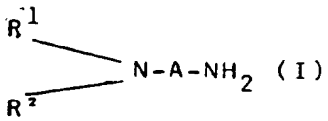
10. Verwendung des Konzentrats gemäß Anspruch 9, worin das Konzentrat zusätzlich enthält:
(b) 0 bis 25 Gew.% der Amine der Formel (III);
(c) 1 bis 30 Gew.% einer Säure, um nach Verdünnung einen pH - Wert von 5 bis 8 zu ergeben;
(d) 0 bis 15 Gew.% eines Dispersionsmittels; und
(e) 0 bis 50 Gew.% eines Auflösungsmittels.

11. Verwendung des Konzentrats gemäß Anspruch 10, worin der Rest des Konzentrats eine wäßrige Basis umfaßt.

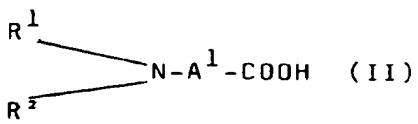
12. Verfahren zum Transport von Flaschen enthaltend die Stufe der Schmierung einer Flaschenförderein - richtung mit einer schmierenden Menge einer wäßrigen Schmiermittellösung nach einem der Ansprüche 1 - 8.

Revendications

1. Utilisation d'une solution lubrifiante aqueuse comprenant (a) de 0,001 à 1% en poids de la solution lubrifiante aqueuse, d'au moins un composé de formule (I) ou (II) :



(I)



(II)

dans laquelle :
R^1 est un radical alkyle ramifié ou linéaire, saturé ou insaturé, de 8 à 22 atomes de carbone,
R^2 est un atome d'hydrogène ou un radical alkyle ou hydroxyalkyle de 1 à 4 atomes de carbone, ou $-A-NH_2$,
A st un radical alkylène linéaire ou ramifié de 1 à 8 atomes de carbone, et
A^1 est un radical alkylène linéaire ou ramifié de 2 à 4 atomes de carbone ;
et ayant un pH de 5 à 8, pour lubrifier des courroies transporteuses.

2. Utilisation de la solution lubrifiante aqueuse selon la revendication 1, dans laquelle R^1 est un radical alkyle saturé ou insaturé, ramifié ou linéaire de 12 à 18 atomes de carbone ; R^2 est un atome d'hydrogène ou $-A-NH_2$; et A et A^1 représentent un radical alkylène saturé de 2 à 4 atomes de carbone.

3. Utilisation de la solution lubrifiante aqueuse selon la revendication 2, dans laquelle R^2 est un atome d'hydrogène et A et A^1 sont un radical propylène.

4. Utilisation de la solution lubrifiante aqueuse selon la revendication 1, dans laquelle le pH de la solution est de 6 à 8.

5. Utilisation de la solution lubrifiante aqueuse selon la revendication 1, dans laquelle la solution comprend au moins une alkylamine grasse de formule (I).

6. Utilisation de la solution lubrifiante aqueuse selon la revendication 1, dans laquelle la solution comprend en outre un ou plusieurs des composants suivants :
b) une alkylmonoamine grasse de formule (III):

$$R^3-N(R^5)-R^4$$

dans laquelle R^3 est un radical alkyle saturé ou insaturé, linéaire ou ramifié de 8 à 22 atomes de carbone,
R^4 est un atome d'hydrogène ou un radical alkyle ou hydroxyalkyle de 1 à 4 atomes de carbone et
R^5 est identique à R^3 ou R^4 ;
(c) un acide pour établir le pH de la solution lubrifiante entre environ 5 et 8 ;
(d) un agent dispersant ; et
(e) un agent dissolvant.

7. Utilisation de la solution lubrifiante aqueuse selon la revendication 6, dans laquelle la solution comprend :
(b) de 0 à 1% en poids de l'alkylmonoamine grasse de formule (III) ;
(c) de 0,001% à 1% en poids d'acide ;
(d) de 0 à 1% en poids d'agent dispersant ; et
(e) de 0 à 20% en poids d' agent dissolvant,
les pourcentages en poids étant par rapport au poids de la solution lubrifiante aqueuse.

8. Utilisation de la solution lubrifiante aqueuse selon la revendication 7, dans laquelle la solution comprend :
(a) de 0,005 à 0,1% en poids d'alkylamines grasses de formule (I) et (II),
(b) de 0 à 0,5% en poids de l'alkylmonoamine grasse de formule (III),
(c) de 0,005 à 0,1% en poids d'acide,
(d) de 0 à 0,5% en poids d'agent dispersant, et
(e) de 0 à 10% en poids d' agent dissolvant.

9. Utilisation d'un concentré pour préparer une solution lubrifiante aqueuse pour courroies transporteuses selon l'une quelconque des revendications 1 à 8, dans laquelle le concentré comprend (a) de 1 à 30%

en poids par rapport au poids du concentré d'alkylamine grasse de formule (I) et (II).

10. Utilisation du concentré selon la r vendication 9, dans laquelle le concentré comprend en outre :
    (b) de 0 à 25% en poids d'amines de formule (III),
    (c) de 1 à 30% en poids d'un acide pour donner un pH de 5 à 8, après dilution,
    (d) de 0 à 15% en poids d'un agent dispersant, et
    (e) de 0 à 50% en poids d'un agent dissolvant.

11. Utilisation du concentré selon la revendication 10, dans laquelle le complément du concentré comprend une base aqueuse.

12. Procédé d'acheminement de bouteilles, consistant à lubrifier un transporteur de bouteilles avec une proportion lubrifiante de la solution lubrifiante aqueuse selon l'une quelconque des revendications 1 à 8.